Developmental Biology 331 (2009) 394–396

Contents lists available at ScienceDirect

Developmental Biology

journal homepage: www.elsevier.com/developmentalbiology

Abstracts

Concurrent session 4: Neural and tissue specific stem cells

Program/Abstract # 29

Foxd3 regulates neural crest multipotency and self-renewal

Nathan A. Mundell[a,b], Audrey Y. Frist[b], Patricia A. Labosky[a,b]

[a]*Departments of Pharmacology, Cell and Developmental Biology, Vanderbilt University, Nashville, TN, USA*

[b]*Center for Stem Cell Biology, Vanderbilt University, Nashville, TN, USA*

The neural crest (NC) is a specialized group of progenitor cells that arise from the developing spinal cord. At the onset of migration, NC is a heterogeneous pool of multipotent and fate-restricted progenitors that follow regionally defined pathways to sites of differentiation, giving rise to a variety of cell types including neurons, glia, melanocytes, smooth muscle, and cartilage. The forkhead transcription factor Foxd3 is required for self-renewal and maintenance of a multipotent state in two other progenitor cell types: embryonic stem cells and trophoblast stem cells. Foxd3 is also one of the earliest molecular markers of the NC. NC deletion of *Foxd3* in the mouse embryo results in severe defects including craniofacial defects, and complete loss of the enteric nervous system. The progenitor pool is depleted and much of the NC is lost by apoptosis in mutant embryos. Lineage labeling of *Foxd3* mutant embryos demonstrates that vagal NC fails to migrate into the foregut, and is greatly reduced in the outflow tract of the heart. Surprisingly, reduced cardiac NC mediates cardiovascular remodeling but not parasympathetic innervation of the heart. *In vitro* clonal analysis of multipotency demonstrates that *Foxd3* mutant NC has reduced potency to differentiate into multiple lineages. Serial neurosphere culture experiments indicate that mutant NC does not maintain progenitor self-renewal. These results demonstrate a global role for Foxd3 in NC maintenance along the anteriorposterior axis, and establish the requirement of Foxd3 in maintenance of NC stem cell subpopulations.

doi:10.1016/j.ydbio.2009.05.038

Program/Abstract # 30

The role of Gli3 in the neurogenesis of the forebrain

Hui Wang, Guannan Ge, Sohyun Ahn

Unit on Developmental Neurogenetics, PGD, NICHD, NIH, Bethesda, MD, USA

The Gli3 is the major negative transducer of the Hedgehog (Hh) pathway as a processed form. Although its role in embryonic patterning has been extensively studied, later role of *Gli3* in cortical development, especially on the regulation of neural stem/progenitor cells, is largely unknown. In this study, we conditionally removed *Gli3* pan-neuronaly starting at E11 using *Nestin-Cre* (*NC*) mice. Compared to the controls (*NC; Gli3*$^{c/+}$), the mutants (*NC; Gli3*$^{c/-}$) exhibit enlarged lateral ventricles and the thinner cortex without a dramatic change in cortical lamination. The proliferation in the ventricular zone (VZ) is reduced at E16 and the intermediate progenitors (IPs) are mostly gone by E18 in mutants. Although the activation of canonical Wnt pathway has been shown to suppress IP formation, there was no change in the *Axin2* expression despite an up-regulation of β-catenin protein level throughout the developing cortex in *Gli3* mutants. Interestingly, more GFAP-positive cells with long radial processes were observed along the ventricular walls in the postnatal mutants. Taken together with the defect in the integrity of ependymal cells along the lateral wall of the lateral ventricle, this suggests that the cellular composition of the neurogenic subventricular zone (SVZ) has changed due to the earlier accumulation of radial glia at E18 that resulted in increased number of astrocytes and/or neural stem cells in the postnatal *Gli3* mutants. In summary, we show that *Gli3* plays an essential role in regulating neurogenic IP formation independent of Wnt pathway during development and in the maintenance of the postnatal SVZ.

doi:10.1016/j.ydbio.2009.05.039

Program/Abstract # 31

The role of cyclical Ph-Snail1 expression during stem cell migration

Roberta L. Hannibal[a], Nipam H. Patel[a,b]

[a]*Department of Molecular and Cell Biology, University of California, Berkeley, USA*

[b]*Department of Integrative Biology and Howard Hughes Medical Institute, University of California, Berkeley, USA*

Cell migration plays a crucial role in development and disease. The transcriptional repressor *snail* drives cell migration in many developmental systems as well as in some metastazing cancers. *In vivo* studies, where single cells can easily be traced and manipulated, are crucial for our understanding of the role of *snail* in cell migration. We are using the mesoteloblasts, the mesodermal stem cells of the crustacean *Parhyale hawaiensis*, as a model for cell migration. The mesoteloblasts are located under just one layer of cells, making them amenable to *in vivo* tracking. Moreover, their two precursor cells are amenable to injections, allowing lineage tracers and gene targeting reagents to be delivered specifically to these cells. Previous research in our lab has found that both *Ph-snail1* mRNA and protein are expressed in the mesoteloblasts when they are migrating, but not